

# Rendezvous team hangs STS-77 plaque

Dave Harshman and Bryan Bertrand represented the Rendezvous flight control team in hanging the STS-78 plaque in the Mission Control Center.

Lead Flight Director Wayne Hale said he selected the Rendezvous team, which also included Steve Walker, Sean O'Rourke, Paul Snow, Rick Davis and Scott Appelbaum, because of the intense effort that was required to develop and train the crew on procedures for the various rendezvous on STS-77.

"STS-77 set a single flight shuttle record for four separate rendezvous operations, 21 hours of proximity operations station keeping, and 49 targeted on-orbit maneuvers," Hale said. "None of these operations was standard and several were unique."

In particular, Hale said, the Spartan station keeping and separation had to maintain proper alignment and distance for science purposes in a difficult R-bar position

JSC

People

while maintaining a safety margin in case the inflatable antenna had jettisoned early from its free-flying carrier. Similarly, the three PAMS/STU rendezvous were extremely innovative in that we approached a target from the trailing side and had a targeted V-bar null maneuver to establish station keeping.

"All of this had to be done in an extremely propellant critical situation where every move had to be optimized for propellant savings," Hale explained. "As a result of the innovative techniques and thorough crew training, the STS-77 crew not only accomplished all four rendezvous but saved enough propellant to have flown a fifth rendezvous had on orbit stay time allowed," Hale said.

### ISD's Kris Weingarten dies after retirement

Kris Weingarten of the Information Systems Directorate, who recently retired from JSC after 30 years of civil service, died May 12 of heart failure.

Weingarten began her career with the Space and Missile Systems Program Office at the Los Angeles Air Force Station in June 1966. She was the secretary for the 14 members of the Manned Orbiting Laboratory flight crew, seven of whom later became NASA astronauts. She later worked on the commander's staff at the Air Force's European headquarters in Germany.

After the tour was completed, she returned to Washington and later became a NASA employee. She worked in the Shuttle Program Office at NASA Headquarters before transferring to NASA's Jet Propulsion Laboratory for approximately three years and then came to JSC.

Here, she supported the Space



HarshmanBertrandWeingartenLulla

Station Freedom Program by participating in the definition of requirements, and initial design, for the program-wide Technical and Management Information System.

After leaving the station program, Weingarten joined the Data Processing Systems Division, now ISD, where she was a Customer Support Team member.

A memorial service was held May 17 at Heritage Park Baptist Church.

### Lulla earns association's Remote Sensing Medal

JSC's Dr. Kamlesh Lulla, chief of the Earth Sciences Branch, recently received the "Remote Sensing Medal" from the Association of American Geographers at its annual national meeting in Charlotte, N.C.

Lulla was honored for his distinguished career in geographical and geological remote sensing sciences.

The AAG's Division of remote Sensing has more than 600 professional members.

Lulla is a widely published author and chief editor of Geocarto International, a multidisciplinary journal of remote sensing and Earth sciences, and chairman of the American Institute of Aeronautics and Astronautics Houston Section's In-Space Imaging and Astronaut Earth Observations Technical Committee.

# IEEE eyes professional awareness

The Galveston Bay Section of the Institute of Electrical and Electronics Engineers will hold a Members Professional Awareness Conference from 6-9:30 p.m. June 20 at the Hobby Holiday Inn.

The MPAC is not limited to IEEE members, and will feature talks and panel discussions on "Changing Trends in Engineering," "Reacting to Bad News," "Preparing a Resume and for an Interview," and "Entrepreneurship and Consulting." Dinner is included.

For reservations or information, call Zafar Taqvi at 212-9275 or Don Cravey at x30148 by noon June 17.

# Juneteenth picnic set for June 21 at Gilruth

The annual Black Cultural Association's Juneteenth Scholarship Picnic will be from 11 a.m.-8 p.m. June 21 at the Gilruth Center.

The deadline to purchase tickets is Wednesday; contact Judith Elam at x34028.

# Spacelab mission gets commander

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34, will be making her first space flight on STS-83 following the successful completion of more than one-year of training to prepare her for assignment to shuttle flights.

Gernhardt, 40, will be making his second journey into space having flown previously on *Endeavour* during STS-69, the second flight of the Wake Shield Facility.

The 16-day Spacelab mission will feature more than 25 micro-gravity science investigations in fluid physics, combustion science and materials science.



Chinese dancers Joyce Shun, left, and Emily Chen, both Clear Lake area students, perform in the Bldg. 3 cafeteria last Thursday as a prelude to the coming American Heritage Week. The dancers were presented by the University of Houston-Clear Lake Chinese Student Organization.

# American Heritage Week begins Monday

JSC begins its celebration of the center's culturally diverse work force Monday with live entertainment in the Bldg. 3 cafeteria, a German cafeteria special and art exhibits.

American Heritage Week will continue through Friday, when a grand finale is scheduled for 3-7:30 p.m. at the Gilruth Center.

Monday's entertainers will be Hip Bones 'N' Motion, and exhibits will feature painting, sculpture and modeling. There also will be a presentation by the Vietnamese Culture and Science Association. The German cafeteria special will be smoked sausage, sauerkraut, German potato salad, a roll butter and a drink.

Tuesday's entertainers will be the Star Spangled Brass and the Houston Philippine Dancers, and the exhibits will feature needlework such as quilting, embroidering and dress making. The Vietnam cafeteria special will include pork and vegetable egg

rolls, fried rice, tossed salad, roll, butter, and a drink.

Wednesday's entertainers will be the JSC Patriotic Choir and Indian Dancers. Collectibles and antiques will be on display. The Mexico cafeteria special will feature chicken enchiladas, Spanish rice, pinto beans, guacamole salad, roll, butter, and a drink.

Thursday's entertainers will be the Aldine Y.O.U.T.H. group, and hobbies such as crafts and woodworking will be exhibited. The American cafeteria special will feature chicken fried steak, two vegetables, roll, butter, and a drink.

The Friday finale will include opening ceremonies and entertainment from 16 different groups, ranging from Irish dancers to classical guitarists. Vintage automobiles and Chinese calligraphy will be on display. The Italian cafeteria special will feature cannelloni beef, pasta verdi, tossed salad, roll, butter and a drink.

# Tether break board blames contamination

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pounds. It used super-strong strands of Kevlar wound around the copper and insulation for strength.

Rigorous tests in support of the investigation established that undamaged tether would not arc, even when subjected to electrical potentials much higher than the 3,500 volts seen during the mission.

"The tether itself was a remarkable engineering achievement," said Ken Szalai, who chaired the investigative board, "and produced some startling scientific discoveries. We believe a tether that has not been contaminated will meet or exceed its expectations."

Post-flight inspection of the tether end that remained aboard *Columbia* showed it to be charred. The board found that the arcing burned away most of the tether material at that location, leading to separation of

the tether by pulling force. The break occurred when about 12.2 miles of tether was unreeled, in a period when the tether was experiencing normal 15-pound stresses.

"The degree of vulnerability of the tether insulation to damage was not fully appreciated," Szalai said. He added that the high voltages under which the system was operating could, over a period of time, have reduced the ability of the tether insulation to withstand electrical breakdown due to contamination.

"Constructing a tether that was strong, lightweight and electrically conducting took the project into technical and engineering areas where they had never been before," Szalai said. "Now, with 20/20 hindsight, they know where the system is vulnerable and can improve the design."

The board said the STS-75 tether

problem "is not indicative of any fundamental problem in using electrodynamic tethers." It also noted that in spite of the break, a "significant amount" of scientific data was obtained during TSS operations.

"Ken and his team did an absolutely great job on the investigation," said STS-75 Commander Andy Allen. "When you're dealing with a process of exploration, you can only deal with the things you think of. But we can't think of everything."

The board said science equipment hardware and mission operations, micrometeoroid or orbital debris impact, and electrical storm activity were not to blame.

The panel recommended more precautions to ensure any future tether systems do not suffer from contamination damage and a design that minimizes the possibility of high-voltage arcing.

# Space News Roundup

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Editor ..... Kelly Humphries  
Managing Editor ..... Karen Schmidt

# STS-77 crew says thanks

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"My final thanks go to the training team because we had a relatively experienced crew, and any time you have a bunch of experienced folks, you have a bunch of bad habits," Brown said. "Thank goodness they corrected all our bad habits and kept us on the straight and narrow."

Garneau noted that it had been 12 years since his first, but said, "it really did feel like it was yesterday, and I think a lot of that was because we were well prepared for this mission."

"There was a great choreography going on," Runco said. "When we thought about something, as soon as we would utter those words among ourselves the ground would call up. This whole dance step we were going through was quite amazing."